

What Is Claimed Is:

1. A mask fidelity inspection method comprising:
 - generating a mask picture from a first mask, the first mask being made from a predetermined mask design with a first OPC model applied thereto;
 - converting the mask picture into a simulation required mask file;
 - conducting a first simulation under a first set of predetermined photolithography processing conditions using the simulation required mask file to generate one or more files of a first set representing a first wafer photo resist profile thereof;
 - applying the first OPC model to the predetermined mask design in a database mask file format;
 - conducting a second simulation under the first set of predetermined photolithography processing conditions using the OPCed mask design to generate one or more files of a second set representing a second wafer photo resist profile thereof; and
 - comparing the first and second sets of files.
2. The method of claim 1 wherein the comparing further includes setting one or more thresholds of the wafer photo resist profile for rejecting the first OPC model used.
3. The method of claim 1 further comprising repeating all the steps by replacing the first OPC model with one or more other OPC models in the second

simulation to determine a preferred OPC model to be used for generating the physical mask.

4. The method of claim 1 wherein the files of the first and second sets includes two-dimension wafer resist profile simulation files.

5. The method of claim 1 wherein the files of the first and second sets includes three-dimension wafer resist profile simulation files.

6. A system for mask fidelity inspection comprising:
an image capturing tool for generating a mask picture from a first mask with a first OPC model applied to a mask design thereon;
a database for providing a database mask file used for generating the first mask;
a first processing tool for converting the mask picture into a simulation required mask file;
a second processing tool for applying the first OPC model to a mask design represented by the database mask file;

a simulation tool for conducting a first simulation under a first set of predetermined lithography processing conditions using the converted mask file to generate one or more files of a first set representing a wafer photo resist profile thereof and conducting a second simulation under the first set of predetermined lithography processing conditions using the OPCed mask design to generate one or more files of a second set representing a wafer photo resist profile thereof; and

a comparison tool for comparing the first and second sets of files.

7. The system of claim 6 wherein the comparison tool further includes means for quantifying mask fidelity errors for rejecting the first OPC model used.

8. The system of claim 6 wherein the comparison tool further includes means for detecting non-OPC related errors.

9. The system of claim 6 wherein the files of the first and second sets include two-dimension wafer resist profile simulation files.

10. The system of claim 6 wherein the files of the first and second sets include three-dimension wafer resist profile simulation files.

11. The system of claim 6 wherein the files of the first and second sets further includes aerial images.

12. A mask fidelity inspection method comprising:

generating a mask picture from a first mask, the first mask being made from a predetermined mask design with a first OPC model applied thereto;

generating a second mask picture from a second mask, the second mask being made from the predetermined mask design with a second OPC model applied thereto;

converting the first and second mask pictures into a first and second mask based simulation files;

conducting a first simulation session under predetermined photolithography processing conditions using the first mask based simulation

file to generate one or more files representing a first wafer photo resist profile thereof;

conducting a second simulation session under the predetermined photolithography processing conditions using the second mask based simulation file to generate one or more files representing a second wafer photo resist profile thereof; and

applying the first and second OPC models to the predetermined mask design in a database mask file format;

conducting a third simulation under the predetermined photolithography processing conditions using the mask design with the third OPC model to generate one or more files of a third set representing an expected wafer photo resist profile thereof;

conducting a fourth simulation under the predetermined photolithography processing conditions using the mask design with the second OPC model to generate one or more files of a fourth set representing an expected wafer photo resist profile thereof; and

evaluating the first, second, third and fourth wafer photo resist profiles.

13. The method of claim 12 wherein the evaluating further includes setting one or more parameter thresholds of the wafer photo resist profiles for identifying the effectiveness of the first or second OPC model with regard to the third or fourth OPC model respectively.

14. The method of claim 12 wherein the evaluating further includes setting one or more parameter thresholds of the wafer photo resist profiles for identifying relative aggressiveness of the first and second OPC models.

15. The method of claim 12 wherein the wafer photo resist profiles are aerial images.

16. The method of claim 12 wherein the files of the first, second, third, or fourth set include two-dimension wafer resist profile simulation files.

17. The method of claim 13 wherein the files of the first, second, third, or fourth set include three-dimension wafer resist profile simulation files.

18. A mask fidelity inspection method comprising:

generating a mask picture from a first mask, the first mask being made from a predetermined mask design with a predetermined OPC model applied thereto under a first mask making process;

generating a second mask picture from a second mask, the second mask being made from the predetermined mask design with the predetermined OPC model applied thereto but under a second mask making process;

converting the first and second mask pictures into a first and second mask based simulation files respectively;

conducting a first simulation session under predetermined photolithography processing conditions using the first mask based simulation file to generate one or more files representing a first wafer photo resist profile thereof;

conducting a second simulation session under the predetermined photolithography processing conditions using the second mask based simulation file to generate one or more files representing a second wafer photo resist profile thereof; and

applying the OPC model to the predetermined mask design in a database mask file format;

conducting a third simulation under the predetermined photolithography processing conditions using the OPCed mask design to generate one or more files of a third set representing an expected wafer photo resist profile thereof; and

evaluating the first and second wafer photo resist profiles with the expected wafer photo resist profile to determine a preferred mask making process for the predetermined OPC model.

19. The method of claim 18 wherein the evaluating further includes quantifying one or more mask fidelity errors for determining the preferred mask making process.

20. The method of claim 18 wherein the files of the first, second, or third set include two-dimension wafer resist profile simulation files.

21. The method of claim 18 wherein the files of the first, second, or third set are aerial images.

22. The method of claim 18 wherein the files of the first, second, or third set include three-dimension wafer resist profile simulation files.